becoming more complex ecologically and more varied taxonomically. Eventually they emerged as the exceptionally integrated systems which we know today, with a reputed two-fifths of all Earth's species in a mere 10% of Earth's land-surface.

This view of tropical forests' palaeoecological pedigree has now been superseded by the theory of 'creative disruption' imposed by the climatic fluctuations of the late Pleistocene. During arid periods of the last 50,000 years or more, tropical forests have been caused to dwindle to mere isolated patches—a process that has triggered the accelerated selection of new species of plants and animals. During the times of greatest contraction of the forests, a few moister localities persisted as 'forest refugia', serving as reservoirs of plant and animal species from which the forests were able to re-establish themselves when wetter conditions returned. These refugia may well coincide with present-day localities which contain a rich diversity of species; certain sectors of tropical forests now feature exceptional concentrations of species, with high levels of endemism.

If this analysis is correct, then these forest refugia deserve high priority in our concern for conservation. We can even assert that, if we can protect these forest tracts in the form of parks and reserves, our efforts will yield a much greater return per conservation dollar than will the protection of much larger areas elsewhere.

These views and theories have been much debated during the 1970s. To review the debate and to collate current findings, and also to draw some action-oriented conclusions for conservation, the US-based Association for Tropical Biology called its Fifth International Symposium at La Guaira in Venezuela for early 1979, with the theme of 'The Biological Model of Diversification in Tropical Lowland Forests'—which may be explained more simply as 'Why are species so numerous in tropical lowland forests, and how do they come to be distributed as they are?'

During the course of some 50 papers, the Symposium looked for answers in the fields of geomorphology, palaeoclimatology, and evolutionary ecology, among other subject-areas; and speakers reviewed the tropics with reference to all major categories of organisms, with some emphasis on plants, birds, and butterflies.

In the event, the theory of Pleistocene refugia emerged from the Symposium both scathed and strengthened. It now appears likely that, on certain occasions, different groups of organisms tended to be concentrated in different refugia. There is, however, a sufficient degree of overlap for a series of primary refugia to be identified in tropical South America. At the same time—and this could be a more critical factor—some present-day centres of species diversity do not coincide so closely as had been thought with the presumed Pleistocene refugia.

This implies that conservation planners should not concentrate too closely on the idea that, if they set aside the refugia areas in parks and reserves, virtually all will be well for species stocks throughout the regions in question. (In any case, it could be a dangerous strategy for conservationists so to 'put all their eggs in one basket'—supposing that if they set aside, say, 10% of Amazonia in protected areas that incorporate Pleistocene refugia and other concentrations of species, they will have constructed an adequate Ark for the foreseeable future. The tropical forest cannot be preserved in such simplistic fashion, because the welfare of the 10% will be influenced by the forms of development and/or disruption that are imposed upon the remaining 90%.)

The results of the La Guaira Symposium are presented in this volume, admirably edited by the Director of Botanical Research at the New York Botanical Garden, Dr Ghillean T. Prance. An opening section deals with the refuge theory in general, then is followed by five sections dealing with various categories of taxa. As most of the participants in the Symposium were drawn from the Americas, and the meeting convened on the edge of Amazonia, it is not surprising that the bulk of the papers focus on the largest and richest part of the tropical forest biome. But a section of the book presents four papers dealing with Old World tropics, from the standpoint of plant communities in general and mammal concentrations in particular. A final Part presents a 'wrap-up' summation of our present understanding of refuge theory, before taking a moderate-length look at the recommendations to be inferred for conservation strategies and programmes.

The book is probably too expensive for many individuals to purchase, but this reviewer strongly recommends it for libraries and other institutions. It constitutes a first-rate compendium of our knowledge and insights concerning a key theory of what makes tropical forests tick—and how we can keep them ticking. And within a broader perspective, of course, the book can be seen as a fine contribution to modern biology, both theoretical and applied.

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Making It Happen: A Positive Guide to the Future, Editor and Project Director JOHN M. RICHARDSON, jr. Foreword by AURELIO PECCI. US Association for the Club of Rome, 1735 DeSales Street NW, Washington, DC 20036, USA: 232 pp., illustr., 27.6 × 21 × 5 cm, soft cover, US$ 9.95, 1982.

Any reviewer faced with the task of writing something about *Making It Happen* must sit firmly on the strong urge to produce a parody beginning something like: 'Hi, yous guys! We're a bunch of really interesting, creative people who live in the USA, which is a really *great* place to be from, and we're into natural resources and ecology, so we threw this outsized paperback together for the US Association for the Club of Rome and we hope you like it a lot. The articles and the ideas aren't arranged in linear logical order or any of that dumb old-fashioned stuff, so you can just kind of feel free to amble through and, you know, grab an idea here and there...'.

Considering the task at hand from a slightly more positive angle, let it be recorded that underneath all the graphic and verbal slapstick, editor John M. Richardson, jr, and his many contributors, state quite a few of those commonly obvious but infinitely worth-while truths that most of us keep on overlooking. People are indeed prior to their ideas; the world as we now find it indisputably forces us to react rationally to the problems posed by its limited resources; and it cannot be repeated too often that open-minded and therefore teachable people are far better equipped psychologically than are others to deal with contemporary problems.

Also, some of the twenty-six contributors to this book turn out to be fascinating people. My personal favourite is the Very Reverend John J. Weaver, retired Archdeacon and Ombudsman of the Episcopal Diocese of California, who now serves as a chaplain to the Burlingame, California, Police Department, riding with policemen on

patrol several times a week; on his second trip out, Archdeacon Weaver found himself in the middle of a shoot-out in which an armed thief got shot to death less than twenty feet (6 m) away from him. Clearly, this man has the courage of his convictions, has learned and seen a great deal more than most of us, and marches rather splendidly to the beat of a different drum.

But I have to admit to serious disappointment when I found that Archdeacon Weaver's expression of his ideas is a great deal less interesting than he himself is—a trend that, unfortunately, sets in quite early in this book. Weaver's article recommends putting Biblical ethics into practice, and he says—quite reasonably and defensibly—that what he calls the ecological imperative is an extension of Jesus' exhortation to 'love one's neighbour'. Which leads to: 'The ecological imperative reminds us anew who our neighbors are. Ecology tells me that my neighbor is the life that touches my life.... The trees have life. Grass has life.... The animals have lives.... So all these are my neighbors' (page 35). Nobody can miss the sincerity of this passage—not even the most hostile critic; but unfortunately, even the friendliest well-wisher will notice its banality and the far-too-simplistic thinking in it. Page after page of *Making It Happen*—even the good pages full of facts and figures and such intellectually challenging (if vague) notions as 'paradigm shift'—offer little improvement in style or tone.

And then, of course, there is that pervasive slapstick. As a piece of graphics, this book looks like somebody's storage room, with strange shapes teetering on peculiar edges; it confuses both the eye and the mind. And the pages that are not devoted to facts, figures, and display of the intellectual tools that are needed to handle life on our kaleidoscopic planet, are all too frequently taken up with writing like this drearily egocentric passage from the Editor's recital of how he got to be himself: 'I was engaged for two years to a lovely, gentle, and rather conventional woman. With her, I might have led an ordered, structured, and conventional life. Instead, a very different sort of wife compelled me to confront and alter the male-oriented patriarchal world view I had assumed was "normal"' (page 22) and so on over most of a very large page. There is also a good deal of boilerplate if effusive praise of the United States, and how it can Show The World The Way in matters ecological— to the point that, in his forward to this book, Club of Rome co-founder Aurelio Peccei drily observes (page 6), 'To foreign ears, the overtones of American self-esteem and pride may seem implausible at a time when the entire human community... faces unprecedented global crises and a clouded future.'

Finally, as the people who worked on this book would quite probably say, the bottom line must always be usefulness. Will this book attract the general reader, will it enlist the general reader's sympathy if not his or her commitment, and will it influence at least some people to act in the various ways which it recommends? Probably not.

In spite of solid virtues that the industrious might eventually unearth throughout its pages, this volume's format, layout, tone, and style, work so industriously against its proselytizing intentions that I cannot see it holding anyone's attention long enough to create the positive impression that its makers obviously desired to create.

Naturally, the sales figures on *Making It Happen* could very well demonstrate that I suffer from a case of terminal Pecksniffitis, and since I cannot see myself as fundamentally hostile to the intent of the whole project, I hope they do. But until they do, the kindest thing I can say to the prospective buyer is that it would be better to find something else to read.

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Petroleum and the Marine Environment—PETROMAR 80. GRAHAM & TROTMAN LTD, Bond Street House, 14 Clifford Street, London W1X 1RD, England, UK: vi + 788 pp., figs & tables, 29.5 × 21.5 × 4.5 cm, stiff paper cover, roneo produced, £37.50, 1981.

This large tome reports the conference held in Monaco in 1980. A somewhat amusing 'Après vous, Gaston', 'Ah non, après vous, Adolphe' sequence of 'opening addresses' and 'opening remarks' by eight speakers (!), clears the way for more worth-while matters. Session 2 deals with cost–benefit analyses of environmental management—surely only of interest to technocrats and those who have a burning penchant for planning to the Nth degree. We are duly impressed by the awesome amount of paper-work involved, the countless hours of committee work, the endless discussions, pro and contra, of every proposal. Sure enough, planning is necessary in tackling the problems at hand of oil accidents at sea, but this ultra-dissection and superordination seems only to result in the disappearance of the problems—but on paper only!

The main, and to the scientific fraternity surely the most interesting, part of the conference was devoted to marine petroleum activities in three major climatic environments—polar, temperate, and tropic—the 31 papers here forming the real 'meat' of the proceedings. This Reviewer found the polar papers to be of most interest, all except one being concerned with the Canadian Arctic. Both literally and figuratively, it is chilling to read the paper by J. G. Napoleani & M. Jozan on drilling activities in treacherous marine areas off the Labrador coast—ever-threatened by giant icebergs the year around, hazards of blizzards, pack-ice, and other unpleasantnesses of such northerly regions.

Equally interesting are conditions encountered in the western Beaufort Sea as reported by A. Grantz & D.A. Dinter. Here there are active progradation, Holocene tectonism, frigid temperatures, subsea permafrost, ever-apt-to-be boisterous seas, polar ice-floes—so that it is but natural that oil recovery is an extremely costly and dangerous effort. E. M. Levy describes petroleum residue concentrations not only in marine waters but also in surficial bottom sediments. Here, on the continental shelf of northeastern Baffin Island, there are natural seepages of oil from the sea-bed that are related to foldings and faultings in a submarine trough, the evidence being gas bubbles and oil-slicks. How long these seepages have been going on is not stated (in geological temporal terms?); but evidently to date there is no noticeable impact on the region as a whole, through what might result when actual drilling operations get under way is an unknown quantity.

Another paper shows how coastal morphology has an influence on the impact of an oil-spill. The supertanker 'Amoco Cadiz' was wrecked off the Breton coast in March 1978, whereupon 233,000 tons of light Arab crude oil were spilled. Of this amount, 62,000 tons were spread along 72 km of coastline, where ten different types of morphology can be recognized. Tidal flats were areas of most persistent oil-spread, whereas the most rapid disposal took place on exposed rocky headlands and